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Electronic and Optical properties of Mn δ-doping InGaAs/GaAs Quantum Wells[1] UDSON MENDES, JOSÉ BRUM, Department of Condensed Matter Physics, Institute of Physics Gleb Wataghin, State University of Campinas, Campinas - São Paulo, Brazil — Recent magneto-optical measurements in InGaAs quantum wells (QWs) with GaAs barriers with δ-doped layers of Mn and C, show a strong oscillations of circularly polarized QW emission as a function of the magnetic field. The oscillations amplitude increases with the Mn content and they persist up to 25 K [Appl. Phys. Lett. **98**, 251901 (2011)]. In order to understand these magneto-oscillations we studied the electronic and optical properties of the two-dimensional hole gas (2DHG) formed in the QW. The holes are provided by both Mn and C doping. We used the spin-density functional theory within the $\mathbf{k} \cdot \mathbf{p}$, the envelope function and the virtual crystal approximations to describe the electronic states of the system. The *sp-d* interaction was described by the Zener kinetic-exchange model. Our results show that when an external magnetic field is applied a spin-polarized 2DHG is formed at the Mn δ-doped layer, inducing an effective magnetic field. This field affects the charge redistribution of the system inducing oscillations in the Fermi and energy levels, and consequently in the QW emission. The strength of these oscillations is strongly dependent on the nature of the Mn doping, in particular the distance between the QW and the Mn layers.

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Udson Mendes
Department of Condensed Matter Physics,
Institute of Physics Gleb Wataghin, State University of Campinas, Campinas - São Paulo, Brazil

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